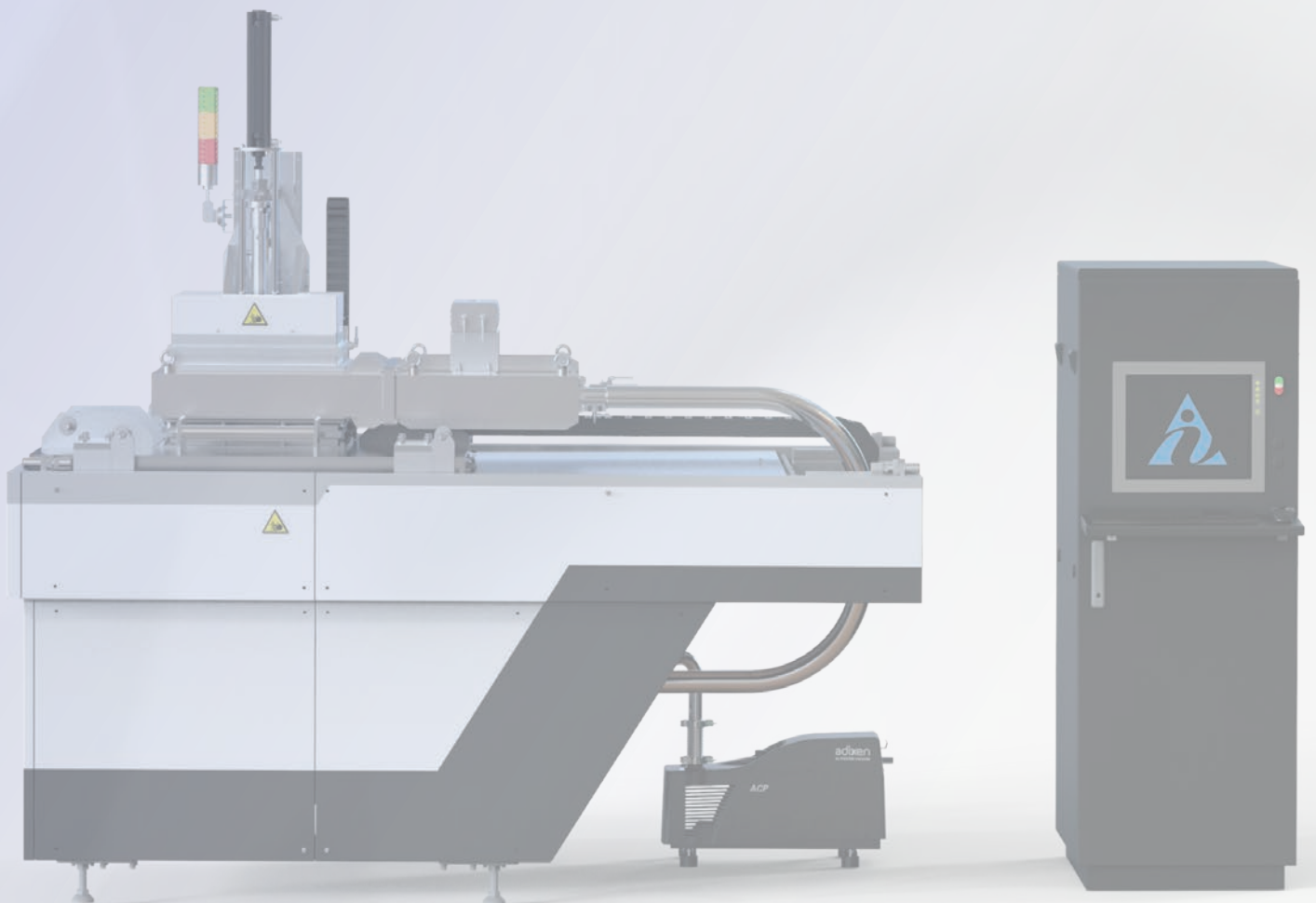




# **DIAMANTA®**

## Vacuum systems for DLC coatings



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# About I-Photonics III

I-Photonics long year experience in working on Ion Beam technology and Thin Film physics and the related R&D works on thin film coatings and coating hardware developments testimony the importance of defining and improving continuously coating processes and provided over the years a consistent process portfolio which defines I-Photonics as an attractive and competitive solution provider.

Following the global market demands we developed Magnetron Sputtering Technology (MS, RMS, PARMS), Diamond Like Carbon Technology for IR optics (DLC by PECVD), E-Beam Evaporation (IBAD), Ion Beam Sputtering (IBS, RF IBS) for precision optics.

Being focused on optical coatings we developed automatic optical process control systems OCP BroadBand an OCP SingleWave that allow to make high precision multilayer optical coating for UV, VIS, NIR, Mid IR ranges with high yield.

Ongoing updates on behalf of the requirements for coatings from the customer demanded from us incessant R&D, which lead to a constant improvement of our equipment and defined the role of the entire company not only as a developer of equipment, but more as a developer of coating solution provider.

The accumulated experience in processes and methods of thin films coatings helps I-Photonics to be specialized in coating services as well. It also positioned I-Photonics as company which provides technological support for each customer and shares the knowledge in thin films.

With each customer our aim is to possibly establish long-term cooperation based on our experience and continuous improvements as a solution provider.



# DIAMANTA® III

## Vacuum systems with Ion-Beam PECVD technology

DIAMANTA vacuum system is intended for deposition of wear resistant diamond-like carbon (DLC) coatings on silicon and germanium substrates. DLC coatings are anti-reflective in IR range in 3-5  $\mu\text{m}$  and 7-14  $\mu\text{m}$ . The method of deposition is chemical deposition of carbon from the gas phase stimulated by plasma of ion-beam source.

### ►► Coatings Applications:

- IR optic products to be used in the extreme operating conditions, where AR coating is used in combination with DLC coating on the front side of external lenses
- Infrared optics
- Customized application

### ►► To be used in:

- Night vision devices
- Thermal imagers
- Sensors
- Pyrometers
- Optical systems for objectives
- R&D

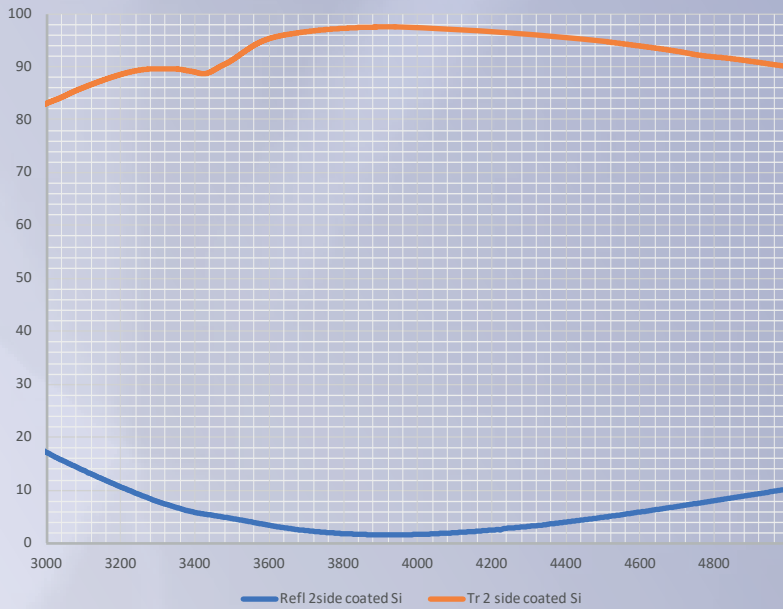


# DIAMANTA® III

## Vacuum systems with Ion-Beam PECVD technology

### ►► Coating examples

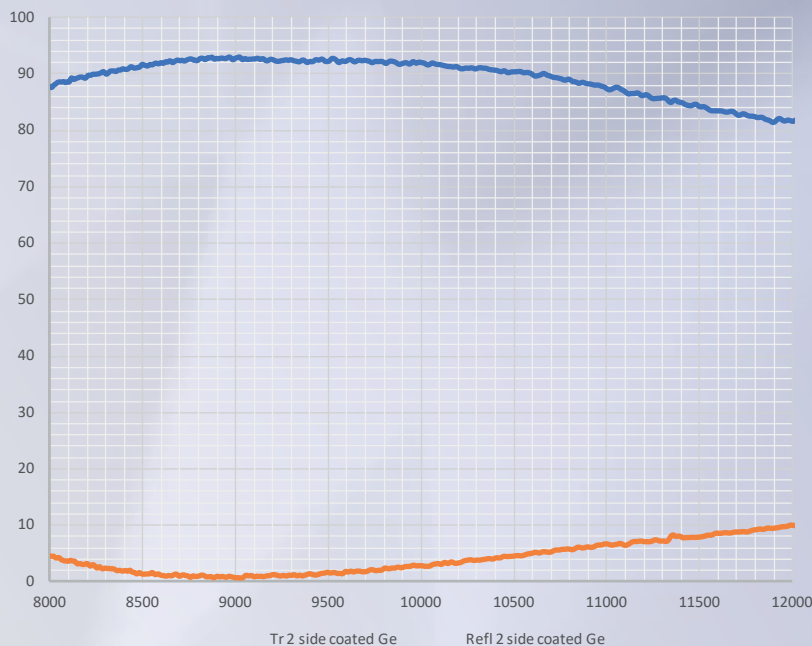
#### ► Si broad band AR coating 3...5 μm



λ	3...5 μm
Min Tr% @3.9 μm ± 50 nm (2 side coated sample)	>90%
Min Refl% @3.9 μm ± 50 nm (2 side coated sample)	<3%

Passed test	Test condition
Humidity (as per MIL-C-675C P4.5.8)	24 Hrs. exposure at RH 95% to 100% at 50°C
Abrasion/Hardness (as per MIL-C-675C P4.5.10)	1. 50 strokes cheese cloth at 500gm force 2. 20 strokes eraser as 1000gm force
Temperature influence (as per MIL-N-13508P4.4.4)	5 Hrs at - 40°C 5 Hrs at + 70 °C
Adherence (as per MIL-C-675C P4.5.12)	Cellulose tape applied to the coated surface and removed slowly
Salt Spray (as per MIL-C-675C P4.5.9)	24 Hrs. salt spray
Solubility (as per MIL-C-675C P4.5.7)	24 Hrs immersion in salt water (10gm per liter)

#### ► Ge broad band AR coating 8...12 μm



λ	8...12 μm
Min Tr% @9 μm ± 50 nm (2 side coated sample)	≥88%
Min Refl% @9 μm ± 50 nm (2 side coated sample)	≤4%

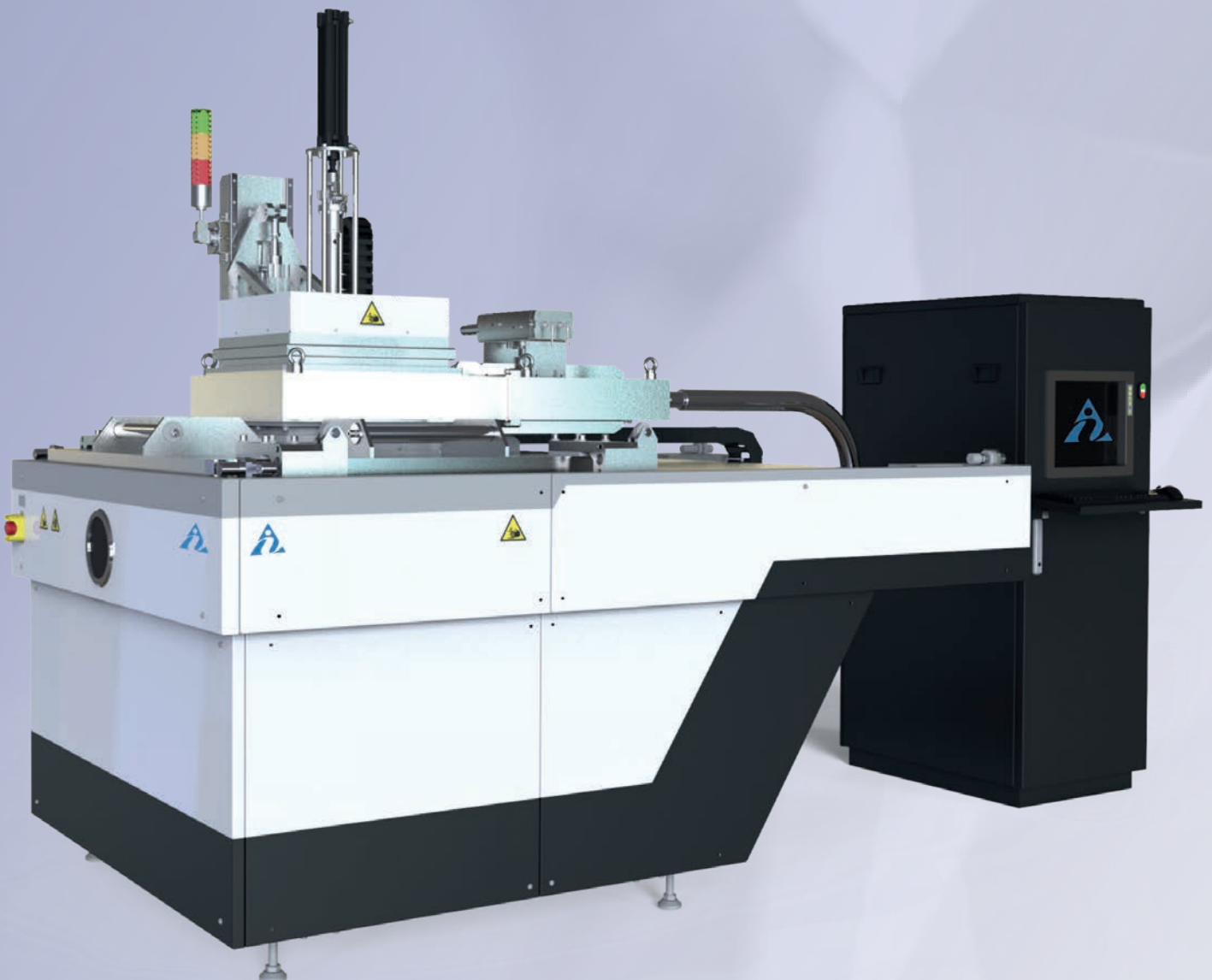
Passed test	Test condition
Humidity (as per MIL-C-675C P4.5.8)	24 Hrs. exposure at RH 95% to 100% at 50°C
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Solubility (as per MIL-C-675C P4.5.7)	24 Hrs immersion in salt water (10gm per liter)

# DIAMANTA® III

Vacuum systems with Ion-Beam PECVD technology

## ►► Coater Overview

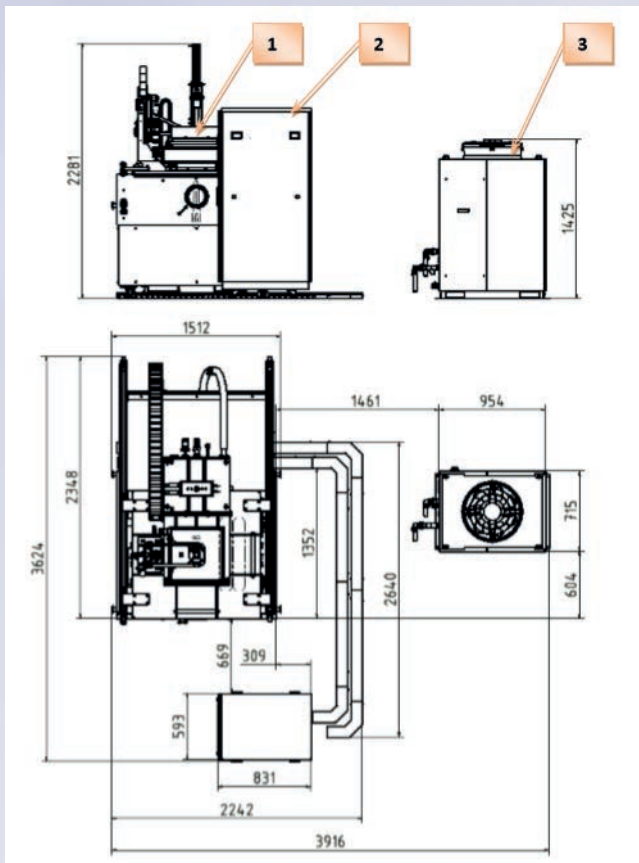
- ▶ **PURPOSE:**  
Deposition of wear-resistant anti-reflecting diamond-like-carbon (DLC) coatings
- ▶ **COATING TECHNOLOGY:**  
Ion-beam PECVD
- ▶ Si and Ge substrates
- ▶ Built-in optical control
- ▶ Full automation



## Coater layout

### Utilities consumption

Resources	Requirements
Electric power	3 phases, 380/220 V $\pm$ 10 %, 50/60 Hz, 5 wires (3 AC, N, PE) Power consumption: no more than 18.5 kW (peak), no more than 15 kW (average)
Water	For filling a water chiller (Distilled water 25 l) No more than 20° C
Compressed air	Dry, oil free, 6 - 8 bar
Argon	Pureness 99.99%, pressure 4 - 6 bar
Oxygen	Pureness 99.7%, pressure 4 - 6 bar
Propane	Pureness 99.99%, pressure 4 - 6 bar

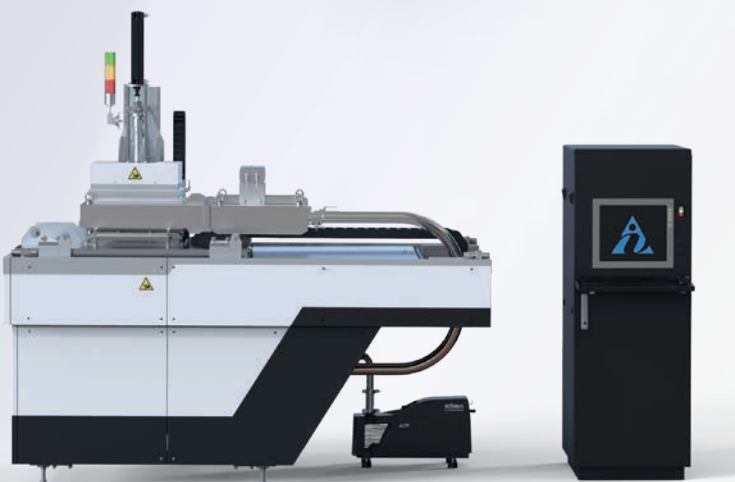


## Composition

1. Vacuum unit
2. Electrical cabinet
3. Water recirculator

## Main technical parameters

Parameters, characteristics	Value
Deposition area, mm	380x410
Maximum substrate thickness, mm	45
Ultimate pressure in clean chamber, no more than, Pa	$8 \times 10^{-4}$
Time to reach base pressure $5 \times 10^{-3}$ Pa in a clean chamber (from start of high-vacuum pumping and after load-lock gate open), min	20
Coating thickness uniformity across 330x350 mm <sup>2</sup> area, %	$\leq \pm 1,5$
Weight, kg, maximum	2000
Cycle time of coating deposition for 3-5 $\mu$ m range, h	2,5
Cycle time of coating deposition for 8-12 $\mu$ m range, h	5







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